

# **Potentiometric Surface Map of the Unconsolidated Aquifers of Marion County, Indiana**

by  
Glenn E. Grove  
Division of Water, Resource Assessment Section  
September 2012

Marion County, Indiana is located in the central portion of the state. Nearly the entire county is situated within the White and West Fork White River Basin, with the exception of the southeastern portion which is located in the East Fork White River Basin.

The Potentiometric Surface Map (PSM) of the unconsolidated aquifers of Marion County was mapped by contouring the elevations of over 4800 static water-levels reported on well records received primarily over a 50 year period. These wells are completed in unconsolidated aquifers at various depths, and typically, under confined conditions (bounded by impermeable layers above and below the water bearing formation). However, some wells were completed under unconfined (not bounded by impermeable layers) settings. The potentiometric surface is a measure of the pressure on water in a water bearing formation. Water in an unconfined aquifer is at atmospheric pressure and will not rise in a well above the top of the water bearing formation, in contrast to water in a confined aquifer which is under hydrostatic pressure and will rise in a well above the top of the water bearing formation.

Static water-level measurements in individual wells used to construct county PSM's are indicative of the water-level at the time of well completion. The groundwater level within an aquifer constantly fluctuates in response to rainfall, evapotranspiration, groundwater movement, and pumpage. Therefore, current site specific conditions may differ due to local or seasonal variations in measured static water levels. Because fluctuations in groundwater are typically small, static water-levels can be used to construct a generalized PSM. Groundwater flow is naturally from areas of recharge toward areas of discharge. As a general rule, but certainly not always, groundwater flow approximates the overlying topography and intersects the land surface at major streams. The contour type was determined based on the amount of data and the degree of change in water levels between wells in each mapped area. In Marion County well depths 100 feet or less were a priority in mapping the potentiometric surface. However, portions of the county are lacking in data and/or are covered by deposits that have limited to non-existent aquifer potential. Therefore, potentiometric surface elevations contours have not been extended through these areas.

Universal Transverse Mercator (UTM) coordinates for the water wells were either physically obtained in the field, determined through address geocoding, or reported on water well records; however, the location of the majority of the water well records used to make the PSM were address geocoded. Elevation data were either obtained from topographic maps or a digital elevation model. Quality control/quality assurance procedures were utilized to refine or remove data where errors were readily apparent.

Unconsolidated potentiometric surface elevations in Marion County range from a high of 840 feet mean sea level (msl) in the east-central region of the county and the northwest corner, to a low of 540 feet msl in the south-central portion. Groundwater flow direction within the White and West Fork White River Basin is generally towards the White River. Within a small area in the southwest corner of the county groundwater flows to the west-southwest towards East Fork White Lick Creek in Hendricks County. Also, in the southeast corner groundwater flows to the southeast towards Buck Creek.

The county PSM can be used to define the regional groundwater flow path and to identify significant areas of groundwater recharge and discharge. County PSM's represent overall regional characteristics and are not intended to be a substitute for site-specific studies.